

A Little Television Background

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Why should I read this?

Buying a new TV is an exciting but also sometimes confusing experience. Sales people are not always knowledgeable and some have incentives to sell specific makes or types of TVs. Buying the right TV can save you money and ensure that you have the best possible viewing experience.

This article is here to help you make an informed decision on which TV is best for you. Issues such as widescreen and HDTV are discussed. Easy-to-understand explanations are backed-up by more technical explanations at the back.

Why consider buying a new TV?

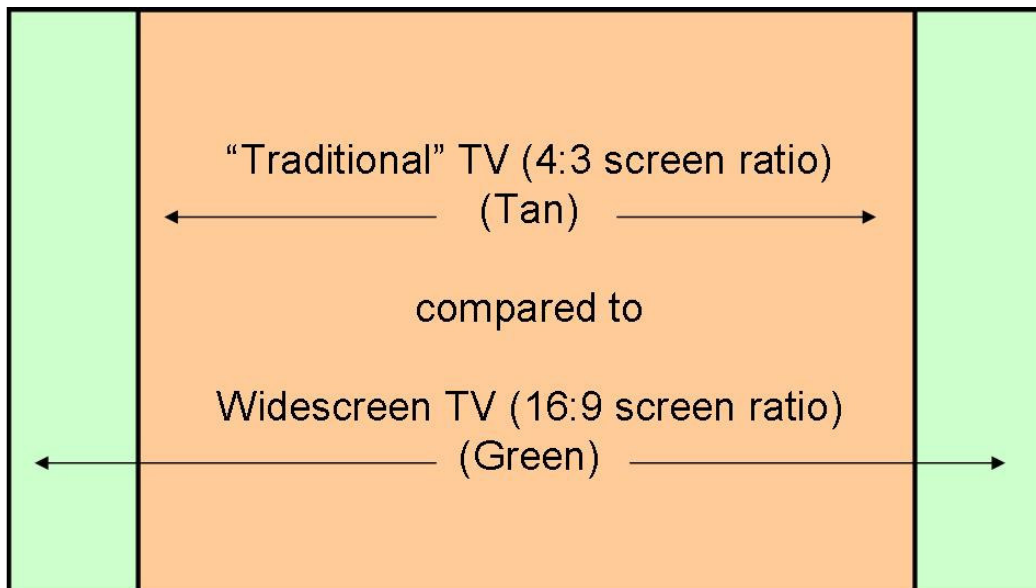
DStv will be introducing widescreen as well as HDTV channels in 2008. This can be viewed much better on the newer types of TVs now available.

Widescreen and HDTV-ready TVs have been available for a while and prices have been dropping steadily. Price drops will continue, but the drops will become ever smaller as the technologies have now matured and competition is ensuring that retailers take smaller margins. So – waiting some more will save you money, but future price drops will become ever smaller.

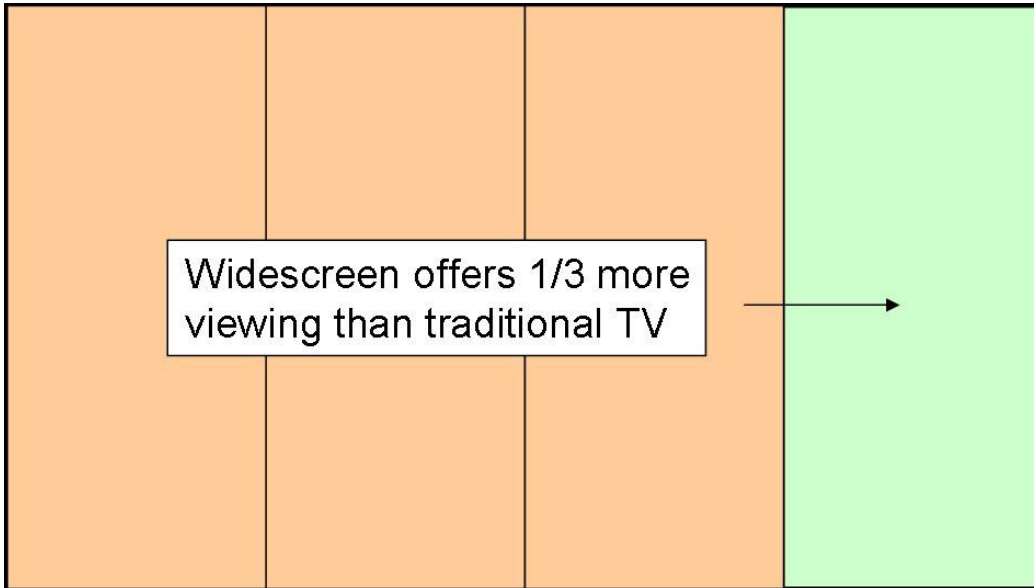
The balance between waiting for the price to come down further and being able to enjoy the technology now is one that everyone has to decide for themselves – but sales trends show that HDTVs are becoming one of the most popular “big-ticket” items – meaning that for many people that balance has now been reached.

So what is widescreen TV?

Widescreen is normal TV – it’s just wider.



Almost all new television material is being made in widescreen format. Most of the current TV we see is the centre cut piece of the originally widescreen picture.



If the widescreen sides are moved together, it is clear that it adds up to 1/3 of standard TV (tan coloured part). This means that 33% of the context of what you are looking at in SDTV goes missing when you only see the normal picture – you could be missing the last defender or supporting player, or the distance to the try-line.



This example shows that the “normal” picture not only does not show who is being talked to, but also does not show who is eavesdropping...



Widescreen is definitely a huge improvement on normal TV.

... and what is HDTV?

HDTV is basically high quality widescreen. When viewed at a distance, the difference is not as apparent...

HDTV picture:



SD (Standard Definition) widescreen TV:



But when you see the picture at more-or-less the size that it will be displayed on your screen, the difference is unmistakable...

HDTV:



SDTV: (Note that the blocking that would normally occur is not shown)



The bottom line is that HDTV looks really good – but you have to have the right equipment and view it from the right distance, otherwise it looks very much like normal widescreen.

What TV choices are there?

Viewing TV does not necessarily mean that you have to have a TV. There are quite a few different ways to view TV. Here are a few options and pointers:

Normal TV sets – Standard Definition (SDTV)

Prices for a normal, standard TVs are now lower than ever before. The reason for this is that most developed countries have stopped selling them and as with anything that has a bigger supply than demand, prices plummet.

Some manufacturers will continue to make “normal” TVs and they will still be sold for many years to come.

This is a good buy if it is what your pocket dictates, if you don't see the value in widescreen or HDTV, if it's not your primary TV or if you just want something to tide you over for the next 2-3 years.

Widescreen TV sets – Enhanced Definition (EDTV)

Widescreen TV starts with ED (Enhanced Definition) TVs. These are plasma TVs with a lower [resolution](#) than proper HD TVs. Although they can display a widescreen picture, they don't offer better picture quality than normal South African TVs.

This is a good buy if you like widescreen but don't see yourself moving to HD by 2010.

Note: Watch out for “HD compatible”: Even some “normal” TVs are HD compatible – it just means you could feed it a HD signal and it will show a picture – but that picture is not going to be HD. It's like saying a black and white TV is colour compatible – yes, it will show a picture when fed with a normal TV signal ... it will just be in black and white.

High Definition TV sets (HDTV)

An HDTV television is basically a widescreen TV that is capable of showing more detailed pictures. All HDTV televisions are widescreen.

An HDTV television has a resolution of 1280 x 720. The two main types of HDTVs are [LCD](#) and [plasma](#).

This is a good buy if your pocket allows as it will offer a superior viewing experience as widescreen and HD TV content is introduced, as well as for viewing digital photo's, videos and even PC and video games.

“True” High Definition TV sets (1080p - capable TVs)

There are actually a few versions of HDTV. You can read more on that in the [Resolution](#) and [Interlaced & Progressive](#) sections.

“Normal” HDTV was discussed in the previous section. The latest buzzword in HDTV is “True” or 1080p capable TVs. These TVs are capable of displaying even higher resolution video and are priced at a premium.

Although the numbers may suggest a much superior picture, the difference is not nearly as impressive as the difference between standard TV and “normal” HDTV and

there some other trade-offs (see the paragraph on ["True" HD](#) in the [Viewing Distance](#) section).

DStv will not be providing channels at this resolution for many years to come as it requires an enormous amount of expensive bandwidth and has debatable value over and above normal HDTV. To use the full potential of these displays, you will need special content from a PC, Blue-ray player or PS3 (gaming console).

This is a good buy if you like living on the edge of technology and can afford it.

Note 1: To experience the higher resolution, you need to sit quite close or have a really big (47" or more) screen.

Note 2: Neither the current HD-DVD's nor the Xbox 360 can provide 1080p content...

Monitors

Monitors are displays that don't have built-in TV tuners. This means that you cannot plug in a bunny-ears antenna and then view the normal SABC or e-TV signals. Most monitors don't have speakers either, so if you view TV, you may need a hi-fi to provide the sound.

Apart from this, there is no reason to avoid using a monitor instead of a TV if the price difference makes it attractive.

For big (32" and upwards) monitors, this is a good buy if it the price is at least R1000 less than the same size LCD TV, or if you cannot fit a similar size TV (with the speakers on the side) into your display cabinet.

For small (19" to 27") monitors this is a good buy if you can get a widescreen one, if you spend more time on the PC than you do in front of the TV, if you can only afford one of the two or if you want your companion to sit really close to you)

Rear-projection TVs

Rear projection has dropped out of fashion like bee-hive hairstyles. There are some quite good technologies, but very few manufacturers are still producing rear-projection TVs and you will rarely find them without an "On Sale" or "Bargain" sticker. The remaining ones are usually very large 4:3 units and they are seldom HDTV capable.

This is a good buy if you find a 16:9 unit at half the price of an equivalent LCD or plasma screen and you can fit it in your '63 VW Kombi.

Projectors

Projectors come in even more variants than TVs and can deliver pictures in sizes that dwarf even the biggest HDTV. Prices also vary a lot and the more expensive models can easily cost 10 times the price of the cheaper ones.

The most common types are [LCD](#) and [DLP](#), but there are also other interesting technologies like LCoS and SXRD.

This is a good buy if you have a really big and dark TV room (Projectors aren't good when the ambient light is too bright) and don't mind paying for a new (expensive) bulb every 2 to 3 years.

Note: You will need a receiver (such as a DStv decoder) as a projector cannot receive television signals by itself. You will also need a good screen – a white wall is not going to cut it. Remember to check the placement of the screen and projector before you buy (or at least make it a provision for your purchase): Projectors don't have infinitely adjustable zooms and you may end up having to place the projector in an awkward position.

Choosing a Display Device

Now that you know what widescreen and HDTV content can do for your viewing enjoyment and what display options are available out there, you need to do a few more things before making a final decision.

Firstly it is important to realise how different content will be [displayed](#). This helps putting into perspective the advantages and sacrifices of the various display types.

Whatever you preferred choice of display, remember to check the [viewing distance](#) before you buy. It will ensure you get the experience you want and prevent you paying extra money for something that won't meet your expectations.

Remember that in order to get the same size picture on a widescreen TV than you had on your old TV, you will need a larger size widescreen TV. This is because screen sizes are measured on the diagonal size of the screen and widescreen TVs are naturally wider, so the same size widescreen TV will have a smaller picture. See the section on [Television Sizes](#) for a table giving equivalent sizes.

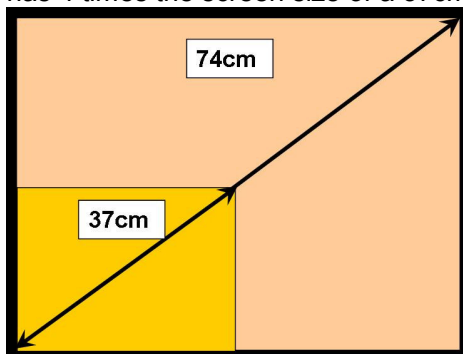
Properly place and [adjust](#) your display to get the optimum viewing experience.

Lastly, remember that to view DStv in HD, you will also need a DStv HDTV decoder...and to connect to that decoder, your display device will have to have either a [DVI](#) or [HDMI](#) connector that is [HDCP](#) certified.

Happy viewing!

Television Sizes

Television sizes refer to the diagonal size of the screen. For this reason a 74cm TV has 4 times the screen size of a 37cm TV:

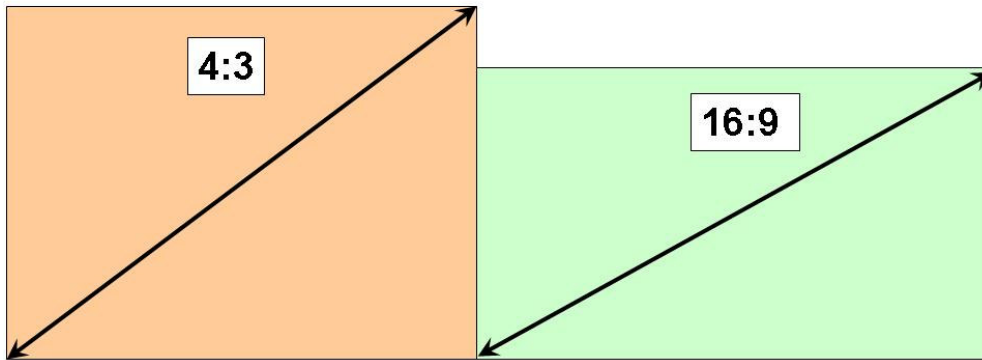


Due to the fact that the US is still by far the biggest market for LCD and plasma TVs, the sizes for most of these TVs are given in inches. (The US still seems to be grappling with the idea of a metric system). However, some SA shops are using cm, so here is a table you can use to make the translation:

Common widescreen (16:9) TV sizes	Approximate metric size
Inches	cm
19	48
22	56
30	77
32	82
37	94
42	107
47	120
50	128

One thing to remember is that due to the diagonal size being used to indicate size, a 74cm (or 37") LCD or plasma will have a wider, but smaller (shorter) picture than a 74cm "standard" TV.

This illustration shows two screens with identical diagonal length, but different vertical sizes due to the difference in width:



This table shows normal and widescreen TVs sizes that will give approximately the same vertical picture sizes:

Normal (4:3) TV Size	Equivalent Widescreen TV (Metric size)	Nearest widescreen TV for same vertical size picture
cm	cm	Inches
37	45	19
54	66	27
64	78	32
74	91	37
84	103	42
94	115	47

In other words, a 32" (or approximately 78cm) widescreen TV will give the same size vertical pictures as a 64cm normal TV.

The Different Viewing Experiences

Using a Standard 4:3 TV

This is the common or garden variety television as used since the time of the dinosaurs.

Viewing normal (4:3) TV

Viewing normal TV on a standard television will obviously give you the current television experience.

Viewing Widescreen

When DStv broadcasts normal widescreen content, there will be two possible ways* to view it on a standard TV - Letterboxed or Cropped format:

*This requires new decoder software – also see [Adjusting your Decoder](#)

Picture as broadcast:



As seen if Letterboxed



As seen if Cropped



Viewing HDTV

Even if you have a DStv HD decoder, it will not be possible to view proper HDTV on a normal TV set as it does not support the higher resolution. However, the analogue outputs of the DStv HD decoder all provide a SDTV (but widescreen) version of the HDTV picture which will provide the same viewing experience as normal widescreen.

Using an EDTV Widescreen (16:9) TV

This is a widescreen version of the standard TV which is not capable of displaying a high resolution picture.

Viewing normal (4:3) TV

When normal television is displayed on a widescreen TV, it should (requires new decoder software) look like this:



When the TV is set to display a widescreen picture regardless of the content it receives, or the decoder is set incorrectly, (or has an older software version) the picture will look like this:



This picture is distorted horizontally, but some viewers still prefer this to having black bars on the side.

Because if it's larger size, flaws in the picture are easier to spot and standard television tend to look a little dated especially if you view from closer than the recommended [viewing distance](#).

Viewing Widescreen

Widescreen is shown in full screen and without any distortion. (Same as "Picture as Broadcast" in the widescreen section on the previous page)

Viewing HDTV

Even though EDTVs may have HDTV-capable inputs, they cannot provide a high resolution picture and any HDTV signal supplied to them will be displayed like a normal (SDTV) widescreen broadcast.

Using a HDTV (720p) TV

This is a “high definition”-ready widescreen TV.

Viewing normal (4:3) TV

Viewing standard TV on a HDTV television looks the same as described in the [EDTV](#) section. Because of the sharper picture, flaws in the picture are even easier to see.

Viewing Widescreen

Viewing standard widescreen is the same as described in the EDTV section.

Viewing HDTV

Viewing HDTV on a HDTV television is the ultimate experience in television. It requires a DStv HD decoder, a subscription and a HDTV broadcast. Note that HD is only passed from the decoder via the HDMI port. It requires an [HDCP](#) certified DVI or HDMI input on the display. When viewed in a properly set-up room and television, it delivers a movie theatre-like experience:



Using a “True” HDTV (1080p) TV

This is a “high definition”-ready widescreen TV that can display even higher resolution pictures.

Viewing normal (4:3) TV

There is no difference in the way a standard television signal is displayed on a HDTV or “true” HDTV display.

Viewing Widescreen

There is no difference in the way a standard television widescreen signal is displayed on a HDTV or “true” HDTV display.

Viewing HDTV

There is no difference in the way a HDTV television signal is displayed on a HDTV or “true” HDTV display.

Viewing 1080p content

Sources delivering 1080p (or higher resolutions) are very limited. Examples include PC & some digital camera content as well as limited Blue-ray DVD & PS3 (gaming console) content. When used with these and at the [correct viewing distance](#), a 1080p-capable display is great and delivers superior picture quality compared to a normal HDTV.

Television Viewing Distances

The distance at which you view your television content is critical to having the best possible viewing experience.

Optimum viewing is at the minimum distance at which the eye can be fooled into thinking that what it is looking at is real. At that distance the picture appears realistic and the image is at its maximum size as seen by the viewer.

The processes needed to record, transmit and display the picture on the uses many shortcuts to make the picture as small as possible and it depends on the eye and brain being clever enough to again construct the proper pictures when given just the minimum amount of information. If the picture is viewed at a closer distance than the system was designed to viewed at, it starts to display blocking and blurring and can cause headaches after extended viewing (as your brain struggles to make proper pictures).

For Standard Television Use

The recommended minimum viewing distance for a standard television broadcast is 6 times the height of the screen. It is interesting to note that if you stick to this formula, you will view the same size picture regardless of the size of the TV that you buy – a 37cm TV at a distance of 1.3m is the same size as a 84cm TV when viewed from 3m.

Illustration showing the optimum viewing distances as well as the fact that if viewed from that optimum distance, TV size is irrelevant:

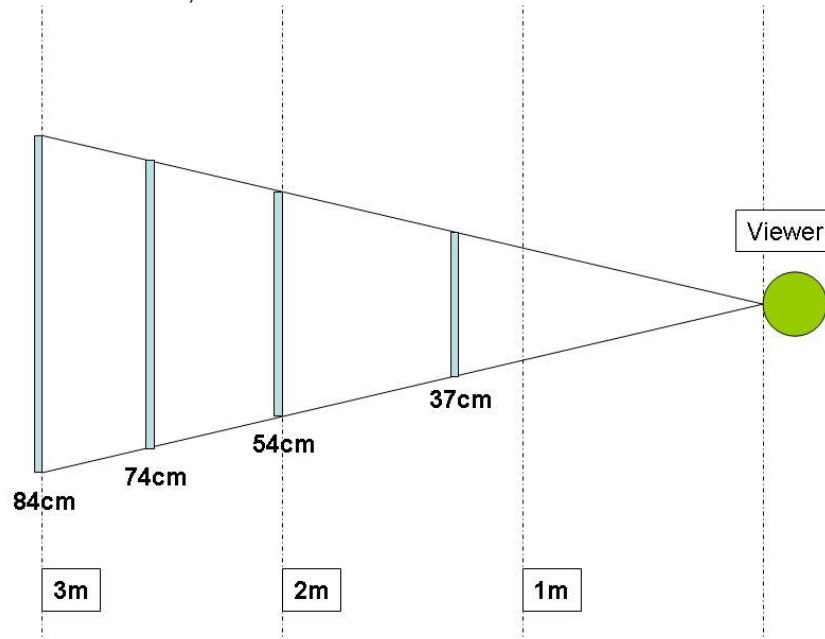


Table of viewing distances for viewing standard television on a normal TV set:

TV Size	Minimum viewing distance
cm	meter
37	1.3
54	1.9
60	2.2
64	2.3
74	2.7
84	3.0

This table shows that if you have a maximum of 2.8m viewing distance between you and the TV, you could buy a 74cm TV, but not a 84cm. (Otherwise you will be sitting too close for viewing normal television)

For High Definition Television Use

HDTV has a much higher resolution with a correspondingly better picture and it can be viewed from as close as 3 times the height of the screen. This is great for watching HD content, but as you will almost certainly still be watching a lot of normal television and you probably don't want to move your couch around all the time, you may need to stick to the 6 times distance as recommended for standard television.

For normal television the maximum viewing distance is arbitrary and can theoretically be quite far away... but the further you are, the less involving the experience. For HDTV owners however, there is a very definite maximum distance – it's when you become unable to tell the difference between the HDTV picture and a normal one. At that point your HDTV could just as well have been a SDTV television, so to avoid the higher resolution from being wasted, you need to sit closer than that.

That distance is determined by the acuity of the human eye and is based on a person with 20/20 vision. The distance from which HDTV and SDTV look the same is in the region of 8 times the screen height. (Note: This assumes best quality SDTV)

To summarise: For optimum normal television viewing, your TVs screen height should be no more than 1/6 the distance from the couch to the TV and if you want to enjoy HDTV, its height cannot be less than 1/8 that distance. (Or to explain it from the other side - you need to sit between 6 and 8 times your screen height away from your HDTV screen)

Table of distances for using HDTV displays for viewing both SD and HD television:

Common widescreen sizes	You need to be further than this to properly view standard television	You need to be closer than this to see HD
Inches	meter	meter
19	1.4	1.9
22	1.6	2.2
30	2.2	3.0
32	2.4	3.2
37	2.8	3.7
42	3.1	4.2
47	3.5	4.7
50	3.7	5.0

An interesting result of compiling this table is the realisation that the distance at which HD becomes irrelevant is the set's inch size – just expressed in metres. (I.e. a 37 inch HDTV set ceases to be HD at 3.7 m)

An example in using this table:

John's couch is 3.3 m from the intended TV screen position:

- The largest TV that he can accommodate without getting a headache when watching standard TV is determined by looking at the first value in the 3rd column that is smaller than his measurement. In this case it is 3.1m which equates to a 42" TV. (A 47" TV would show blurring and blocking on normal television at 3.3m)
- The smallest HDTV that he can buy and still get any value from a HDTV picture is determined by looking at the last column and finding the first value bigger than his measurement. This is 3.7m and indicates a minimum of a 37" TV. (A 32" TV viewed from 3.3m would not be HD anymore).
- The result is that the best size HDTV for John is between 37" and 42".

The final conclusion is that the best distance for viewing all types of television without moving your couch around, is about 6 times the height of your screen.

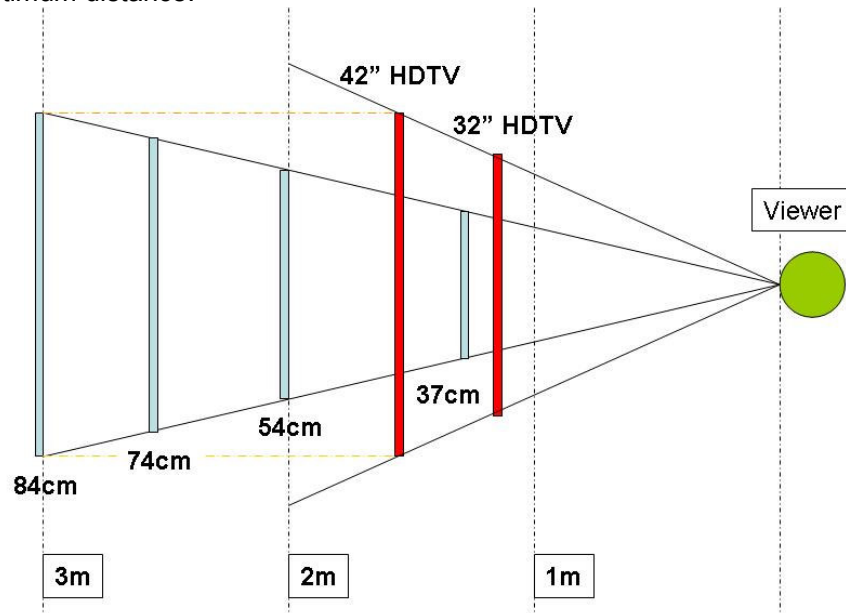
For "Home Theatre" Use

Various authorities agree that home theatre is best experienced when the video occupies about 30 degrees of your field of view.

At the optimum viewing distance for watching standard television, a widescreen picture only occupies 16.5 degrees of your field of view. However - at the optimum (minimum) HDTV viewing distance, this increases to 30.6 degrees.

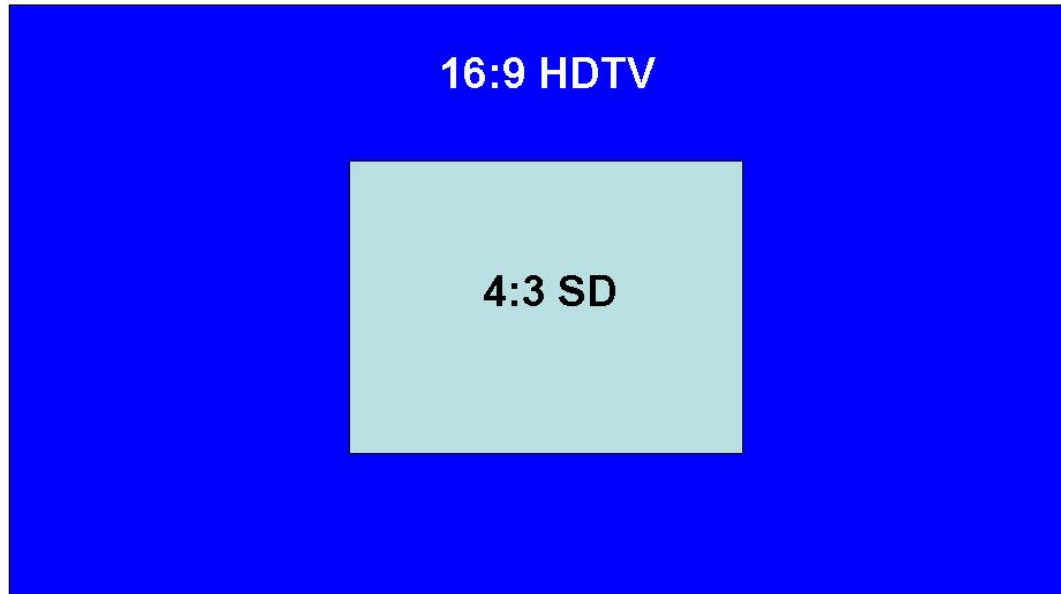
HDTV can therefore provide the viewing environment as recommended for home theatre entertainment.

This illustration shows the difference in viewing distance and (vertical) screen size when viewing standard television (light blue lines) and HD television (red lines) at the designed optimum distance:



Note if the screen width was used instead of the screen height, the difference would be even greater because of the 16:9 being wider than 4:3.

The illustration below shows the enormous difference between the relative sizes of SDTV and HDTV when viewed at their optimum viewing distances:



This change requires moving from the normal viewing position (for viewing standard television), but the drastic increase in realism and enjoyment make it worth while - at least for special occasions.

This table shows the optimum (minimum) viewing distances for viewing HD television on a HD-capable displays.

Common widescreen sizes	The designed viewing distance for HD (full home theatre experience)
	Inches
19	0.7
22	0.8
30	1.1
32	1.2
37	1.4
42	1.6
47	1.8
50	1.9

Should John buy a 37" TV, he would have to move to 1.4m from the screen to get the full home theatre experience. Had he bought a 42" TV, he would need to sit at 1.6m.

“True” HD

Due to the physical limitations of the human eye, a 1080p picture and a 720p picture looks the same when viewed from further than approximately 4.5 times the vertical size of the screen.

Because viewing normal TV requires you to be at least 6 times the vertical screen size away, this effectively means that unless you move your couch when you watch different types of content, you will either have no value from 1080p, or a bad experience watching normal TV.

Table showing you need to sit so close to see the 1080p difference that you won't be able to watch normal television from then same position:

Common widescreen (16:9) TV sizes	You need to be further than this to see proper standard TV	You need to be closer than this otherwise "True" HD looks like "normal" HD
Inches	meter	meter
19	1.4	1.1
22	1.6	1.2
30	2.2	1.7
32	2.4	1.8
37	2.8	2.1
42	3.1	2.4
47	3.5	2.6
50	3.7	2.8
60	4.5	3.4

It's interesting to note that from the BBC's research the "average viewing distance" of 2.7m would require a screen of at least 50" to be able to see any difference between HD and "true" HD.

Final Word

Regardless of the type of TV you buy the ideal display size will have a vertical height of no more than 1/6 of the distance between your couch and the screen. You can always move closer to get the home theatre experience on HD – but you can't always move further if standard TV looks icky.

Remember – at their optimal viewing distances, all screen sizes appear the same to the viewer, so bigger is not always better.

Adjusting your Television

As stated previously, properly adjusting your display is essential otherwise even the best equipment can give a bad viewing experience. The following adjustments are found on almost all televisions and could make your viewing much more realistic.

- 1) First, place the TV correctly. The worst spoiler you can have is light that is reflected off the screen, so that should have the highest priority. A darkened room improves the experience, but the room should not be totally dark. The ideal is a dim light behind the TV, or one shielded in such a way that you can't directly see the light or any bright reflections.

- 2) Now ensure that you get the best possible picture by using the highest quality [interface](#) (connection) at your disposal.
- 3) The next essential step is to find high quality content. Trying to adjust the display to accommodate a bad picture is the worst thing you can do. I suggest a local news program. These are live, so they don't have the any recorded-to or played-back-from issues, the best quality cameras are used and the lighting is optimal.
- 4) If you are adjusting a widescreen TV, set the Arc (Aspect Ratio Control) to fit the content – this will avoid distortion of the picture, which may affect your adjustments.
- 5) Now, sit at the right distance (6 x the vertical screen height is optimal for watching normal television) and start by adjusting the colour setting right down until the picture is black and white. (This helps you focus on the picture without being distracted by colour.)
- 6) Set both brightness and contrast to their centre positions.
- 7) The brightness (or black level) is now adjusted until the black areas and shadows look realistic without the picture starting to look like a horror movie shot in a basement without a window. Note that it is not possible to adjust black to be inky black – whatever your display type, a little light always leaks through and a balance needs to be reached where blacks look black without losing detail: If any dark area has detail on it, e.g. if the presenter wears a jacket with a pin stripe; the picture should be bright enough to still show it.
Tip: If you are adjusting a widescreen TV, switch to DMX and view in 4:3, so the picture has black pillars on the side) – adjust the brightness up and then bring it down until you *just* can't see the difference between the black parts of DMX and the pillars anymore.
- 8) The contrast (or white level) is now adjusted so the white parts of the image and overall lighting are correct. Contrast is usually set very high by default because it makes images look brighter in the store. A too high contrast setting distorts straight lines, increases eyestrain and shortens the lifespan of the display. A too low contrast setting makes the picture look dim and washed-out. Concentrate on the lighter sections of the picture and ensure that pure white areas still show detail (e.g. creases in a shirt). You should now have a perfect black-and-white picture.
- 9) Adding the colour back in is next. Slowly add colour until the picture starts looking natural. Too much colour looks garish and unrealistic. It's most noticeable with reds. Concentrate on skin tones. If the picture looks drab, you can increase colour slightly at the expense of accurate skin tones. Colour is now set.
- 10) Sharpness, if available, adds an artificial edge to objects which sometimes helps but can spoil good, sharp images. Leave this at a low setting (even zero) unless you see fuzzy edges on e.g. text. A good test to check sharpness is to put up the DStv channel grid (push the left or right arrow). Unless the text is fuzzy, leave the sharpness low. Check that the areas between adjacent letters don't start changing colour.

11) Any other settings such as Tint can be left in the centre setting.

The Custom/ User setting is now ready for use and should be used whenever the lighting in viewing environment is ideal. Any other pre-set modes such as Sport, Movie, Dynamic, etc. settings should be used when viewing in brighter light.

More advanced and accurate methods for adjusting displays are available, but it usually requires special colour and line charts, DVD's etc. It is best left to professionals. (It is usually only them that can see a difference between a TV adjusted like that and one adjusted like described above, in any case)

Adjusting your Decoder

SCART output

The SCART connection is a European standard and very few TVs outside of Europe are equipped with them. It does however have the ability to provide [S-Video](#) and [RGB](#) signals and it is for this reason that the output might need to be adjusted.

The correct adaptor (E.g. SCART to S-Video) or cable is required. The output must then be adjusted to provide the desired signal format. As the output might be useless (not viewable) until after it has been adjusted, it is recommended that a secondary connection such as [composite](#) is used when accessing the menu to make the change.

The setting is found under the TV Installation section in the Advanced Settings menu and it will require the menu PIN number (9949)

Aspect Ratio

This determines the way that the decoder formats the signal before passing it to the display. Aspect Ratio is found under TV installation in the Advanced Settings menu.

On the current software the setting should be 4:3 if you have a normal TV and 16:9 if you have a widescreen TV. (The default value is 4:3)

From the next version of software the choices will be:

- 4:3 Cropped
- 4:3 Letterboxed
- 16:9

The first two are both used when you have a normal 4:3 TV. Both settings will show you normal TV when viewing normal channels. The difference comes in how the picture is displayed when you view a widescreen channel:

- If you choose 4:3 cropped, you will see the centre portion of the widescreen picture only: (This is also what you will see when you select 4:3 on the current software)
- If you choose 4:3 letterboxed, you will see the whole widescreen picture, but it will be shrunk to fit your (4:3) screen.

Widescreen picture as broadcast:



(Also seen like this on a widescreen TV if the setting is 16:9)

As seen if Letterboxed



(Only available with new software)

As seen if Cropped



(This is also the effect of the current 4:3 setting)

The 16:9 setting will obviously display widescreen channels in proper full screen as shown in the centre picture above. This setting will however also function slightly differently as from the next version of software. The difference comes in, in how a normal 4:3 channel is displayed on a widescreen display:

Pillar-boxed normal TV
(Picture shown in original format)



(New software)

Stretched normal TV
(Picture stretched to fill the screen)



(Current software)

Please note that even when the new software provides the pillar-boxed (proper ratio) picture as shown, you will still be able to stretch the picture to fill the screen if you so desire by changing the aspect ratio control (ARC) on your TV.

Why has DStv chosen to use 720p HDTV?

1080i/25 HDTV does not look better than 720p/50 HDTV – See the [Resolution](#) and [Interlaced and Progressive](#) sections. Theoretically, from a pixel-count perspective, 1080i supports better resolution than 720p, but due to limitations associated with interlacing, the actual difference is negligible. What's more, 720p produces better viewing when it comes to quick movement as used in e.g. action movies and sports. Lastly, 720p survives the processes required to get through the satellite and decoder, to the TV, much better than 1080i.

The 1080i debate can therefore be closed.

The next step up is “true” HD (1080p/50 if you want to be accurate) – and that requires more than twice the bandwidth of a 720p signal. With 1080p only yielding any value at distances from which normal TV cannot be viewed (See [Viewing “True” HDTV](#)), and 720p already able to provide a movie-theatre experience, the question is: “What value would 1080p really add?”

The answer is that 1080p will only become a real option once (in your opinion at least) there isn't any traditional (standard resolution) television worth watching anymore.

To seal matters for the foreseeable future, there is no 1080p television content available in any case.

Appendix 1 - Digital and Analogue

The two main types of signals used for communication is analogue and digital. An analogue signal in some small way mimics what it is transporting – something that is loud or bright, will be bigger than something that is soft or dark, etc.

An analogue signal is constructed through a process called modulation. There are many types of modulation, each with its own strengths and weaknesses.

During transportation analogue signals will without exception slowly deteriorate – loud parts will become softer and noise will start to creep in. Just think of a radio signal when you start getting far away from the nearest tower.

A digital signal is all 1's and 0's. The original object is divided into many, many little blocks and each block is looked at individually – its position and all its characteristics are recorded in a number format which is then expressed in binary (which is just another numbering system which uses only 1's and 0's). This process is called digitisation.

The more little blocks you use, the more accurately the resulting digital image will represent the original. For a picture, the number of little blocks is the [resolution](#).

Digital signals also deteriorate, but they have checks and balances and can even do error correction if small parts are corrupted. If the signal deteriorates beyond the point where it can be repaired, it collapses very suddenly – there is very little warning. The result is that when a digital signal arrives at its destination, you either get something that is exactly like the digitised original, or nothing.

The transition between the two is very sharp. Think of your DStv signal when it rains – the periods where you get blocks and broken sound are very short as it is then on the knife edge between having a perfect picture and nothing at all.

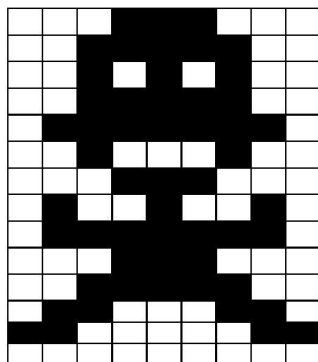
One method for reducing these losses and deterioration on both analogue and digital signals is to separate the various components of the signal (e.g. video and audio) and to use separate cables and [connectors](#) to carry them.

By separating these components, interference between them is eliminated and because each one uses a dedicated and less congested “road”, losses are also reduced.

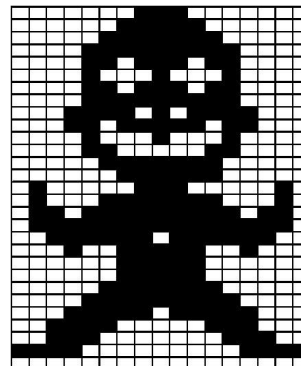
Appendix 2 – What is Resolution?

The resolution is basically how much detail you can see on a screen. The picture as seen on a normal 4:3 TV has a resolution of about 768x576. This means that there are 768 columns and 576 rows of dots (or pixels) making up the picture.

Low resolution



High resolution



(More accurate)

An ED (Enhanced definition) TV has a resolution of 852x480. (The 852 is because the picture is wider, and the 480 comes from the American TV standard, which has a lower resolution than our local TV)

A HD (High Definition) TV supports resolutions of up to 1280x720.

A “true” HD TV supports resolutions of up to 1920x1080.

Appendix 3 – Differences between Interlaced and Progressive

With interlaced signals (like 576i and 1080i) a picture is built up in two steps. The first step is to draw the even lines and the second step is to fill in the odd lines. An interlaced signal therefore requires 2 fields (one odd and one even) to make 1 picture frame.

A progressive signal (like 720p and 1080p) on the other hand draws all the lines at the same time, so one field = one picture frame.

An interlaced signal requires less bandwidth but a progressive display of the same resolution will show a more detailed image.

Modern screen types can only draw progressive pictures, so if they are fed an interlaced signal, it has to be converted before it can be displayed. This conversion is detrimental to picture quality.

The bottom line is that a 1080i picture does not look better than a 720p picture when displayed on a progressive display.

Some more details and jargon:

There are two standards for indicating interlaced and progressive displays.

The EBU (European Broadcasting Union) uses e.g. 720/p/50 and 1080/i/25 with the 50 and 25 referring to the picture frame rate.

The SMPTE (Society of Motion Picture and Television Engineers) would express the same thing as 720/50/p and 1080/50/i, but this indicates *field* rate instead of *frame* rate, so you are not comparing apples with apples, as the 1080i looks superior to the 720p – but the 720p is actually producing twice as many complete pictures.

In other words to have the same viewing experience as 720/p/50 but at a higher resolution, you need to look at 1080/p/50.

Beware: most salesmen and marketing literature omits to mention the frame rate – or uses the field rate – so although 1080p seems like a standard, they could be punting 1080/p/25. While that may be progressive and have a higher resolution than 720p, it has a much lower frame rate and it is only really valuable when you have pictures without a lot of movement as 25 frames per second is a little slow for tracking quick movement. (So watch out – 1080/p/25 is not a worthwhile improvement on 720/p/50 unless you are using it for digital stills)

Appendix 4 - Connections/ Interfaces Used by DStv

Analogue

As explained in the [Digital and analogue](#) section, analogue signals suffer losses and the image that arrives at the destination is never as good as the original.

Due to [copy protection](#) issues, even the analogue signals from DStv HD decoders that are capable of HDTV, are limited to [standard TV resolution](#). So for HDTV purposes, a digital interface has to be used.

Nonetheless, if you don't have an HDTV, or if for any reason you would like to make use of analogue, choosing the most appropriate interface will ensure you get an optimum quality standard resolution picture.

Interfaces that break the information into different components (and require multiple connections) usually give better results than interfaces carrying combined information.

RF connector

Also known as the TV antenna, this is the simplest analogue connection and allows the audio and video of many channels through one cable and into a simple connector.

It is found on all DStv decoders and is the easiest and cheapest way to connect to a TV – especially if it is far away from the decoder. This interface suffers significantly from interference and it is the least desirable way to connect your decoder and display. It normally carries only mono sound.



RF Cable



RF connector on decoder

Due to the ease with which one of these connectors can become dislodged, as well as the problem of sub-standard retail cables and connectors that have been sold in the market and which resulted in the centre pin of the connector on the decoder breaking off, these connectors are now being replaced by F-type connectors:



F-Type cable connector



F-type connector on decoder

F-type connectors are also easier to fit, offer a much more secure connection, don't cause reflections and are cheaper than the normal TV antenna connectors.

Composite

Also referred to as CVBS (Composite Video Blanking and Sync), this interface on the DStv decoder uses three RCA connectors (red, white and yellow). It only handles a single channel at a time and separates the video from the audio. Audio is then further divided into left and right and can provide stereo sound.

The result is a dramatic improvement compared to the RF interface. This interface can be found on all DStv decoders and almost all TVs. It is a good connection to use on non-HD TVs within the same room as the decoder.



RCA cable

Component

Component interfaces only carry video. Audio has to be sourced from either the composite or digital audio interfaces.

As inferred by the name, component interfaces break video down into different components.

They offer increasingly better video quality than composite, but the differences are small compared to the huge leap between composite and RF.

S-Video

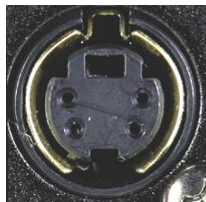
S-Video is the first of the component interfaces and breaks video down to brightness (luma) and colour (chroma) components. It is also known as Y/C.

It uses a mini 4-pin DIN connector and as DStv decoders don't offer this connector separately, it can only be used if your decoder has a SCART interface.

Even if your decoder has a SCART interface, you still require an adaptor as well as a menu change of the selected SCART output in the setup menu. (Refer to your decoder manual)



Cable connector



Connector on decoder



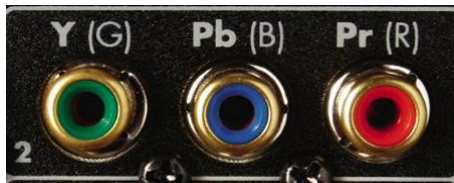
SCART adaptor

P.S. S-video is *not* S-VHS.

YPrPb

YPrPb (or YPbPr) goes further than S-Video in that it breaks the chroma (colour) components down into blue and red. This is the interface that most people mean when they talk about component video.

Although YPrPb supports HDTV resolutions, it is limited to standard TV resolution due to copy protection issues.



YPbPr connector (The specific picture shows a device on which the RGB connection would use the same inputs/ outputs)

The DStv HDTV PVR is the only DStv decoder to have a dedicated YPrPb interface and it is recommended for use if the HDMI connection cannot be used for any reason. Special cable can be used, but normal red, white and yellow RCA cable will do just fine (Just remember to connector the colours the same way around at both ends)

RGB

The last type of component video is RGB. It consists of three signals: red, green and blue.

Like S-video, it is also only available through the SCART connector on some DStv decoders and also requires an adaptor and a change in menu settings.

SCART

SCART is a European standard multi-function connector. It is not commonly found on televisions in South Africa.



A SCART cable



SCART connector on the decoder

The output of the SCART connector can be changed to CVBS, YPr,Pb and even RGB (but not in all instances). This usually requires an adaptor or special cable.

Digital

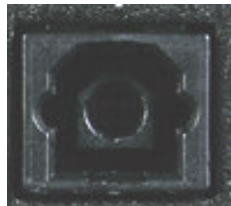
S/PDIF

The name stands for **Sony/Philips Digital Interconnect Format**. It carries digital audio only.

This interface is for when you use a home theatre system to provide the sound for your DStv (as TVs normally do not have a S/PDIF interface).

It will provide either PCM or Dolby Digital – depending on what is present on the channel. Home theatre systems almost without exception provide a setting that will automatically switch between PCM and Dolby Digital on an external input and that is the one you should be using.

There are two types of connections used – optical and electrical. Newer generation DStv decoders all have at least the electrical interface, while PVR's have both.



Optical connector on decoder
(Cover removed)



Electrical connector on decoder
(Note: Colour is orange, not white as shown)

There is basically no difference between the two quality-wise, but the cable for the electrical interface (normal RCA) is a lot cheaper than an optical cable.

HDMI

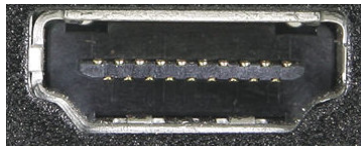
The High-Definition Multimedia Interface (HDMI) is an audio and video interface. It is *the* standard for digital TV interfacing and provides the necessary copy protection ([HDCP](#)) insisted on by the content providers before supplying premium HDTV content.

HDMI supports any TV or PC video format, including standard, enhanced, or high-definition video, plus multi-channel digital audio.

HDMI is backward-compatible with DVI-D (Digital Visual Interface) which is a video-only interface.



HDMI cable



HDMI connector on decoder
(Approximately x10 enlarged)

The Digital Visual Interface (DVI) is a video interface standard designed to maximize the visual quality of digital display devices such as flat panel LCD computer displays and digital projectors. It was developed by an industry consortium, the Digital Display Working Group (DDWG). It is designed for carrying uncompressed digital video data to a display. It is partially compatible with the High-Definition Multimedia Interface (HDMI) standard in digital mode (DVI-D).



DVI to HDMI adaptor (Required if your TV has a DVI connector and no HDMI)

Appendix 5 – Common Display Types

CRT

Cathode Ray Tubes (CRTs) have been the basis of TV technology for nearly 50 years. The technology is fully mature and the picture quality on a good CRT is a match for any of the other newer technologies. Its bulk and inability to scale to larger sizes will see it slowly disappear towards the budget side of the display market.

Plasma

Plasma screens subjectively provide a more natural picture than LCD screens. They have glass screens and are more likely to reflect light which may be distracting in rooms with non-ideal lighting. The driver electronics of plasma needs to work harder at high altitudes, so look for models that are specifically designed to cope with that if you live on the Highveld.

Plasmas no longer suffer from significantly shorter life expectancy than LCDs, they don't consume significantly more power and the latest models will not easily suffer from burn-in.

Plasmas come in EDTV and HDTV – so check the [resolution](#) to make sure you get what you want.

LCD

LCDs' picture quality is subjectively more artificial than plasmas and their usable viewing angle is narrower than that for plasma (but unless you want people to sit in a half-circle when watching TV, it is more than wide enough). Their better brightness and matt screens make them better suited to well-lit or daylight viewing and they don't suffer from burn-in. LCDs are usually capable of HDTV.

Latest generation LCDs have sufficiently quick response times (many previous generation models showed blurring when there was quick movement) and their black-level has also significantly improved, matching plasma on better models.

Pricing is still higher than plasma on larger sizes, but the difference is becoming smaller and on 37" and smaller models, LCD is the only choice.

DLP

DLP or Digital Light Projection is mostly found on projectors, and they provide a very natural picture. DLP TVs are scarce and usually more expensive than similar sized plasmas or LCDs.

Appendix 6 - Copy Protection used by DStv

Digital signals have all kinds of advantages, one of the biggest being that it can be duplicated without losing any of the information that was present in the original signal.

A well-made digital copy is always exactly the same as the digitised original – regardless of how many generations of copies are made.

For this reason, content providers insist on good copy protection to prevent digital piracy.

With analogue, the product that arrives at the destination will always be “weaker” than the original, so if you have a copy of a copy of a copy, it will not look or sound that good anymore.

However, a good analogue picture can be digitised and further copies can then made digitally without further loss of quality, so copy protection for analogue signals is essential as well.

Analogue copy protection depends on specific hardware limitations on the receive devices to prevent copying. Digital copy protection requires authentication from the destination before allowing any content through.

Because of this relative weakness in analogue copy protection, content providers have decided to only allow HDTV through digital interfaces that support digital copy protection.

HDTV content will therefore go out in high definition (HD) on digital interfaces and in standard resolution on analogue interfaces.

Here follows brief descriptions of the various copy protection mechanisms used by DStv:

MacroVision

MacroVision is an analogue copy protection system used mostly on VHS tapes does not have the capability to provide protection for higher resolution (HDTV) content.

CGMS-A

Copy Generation Management System – Analogue can provide protection for higher resolution analogue video and can also permit a single back-up copy if the content allows it.

It requires integration on the receiving equipment (e.g. tape or DVD recorders) and is not 100% supported by the consumer electronics industry. As a result it is largely restricted to use in America and is not a suitable protection mechanism for HDTV in Africa.

HDCP

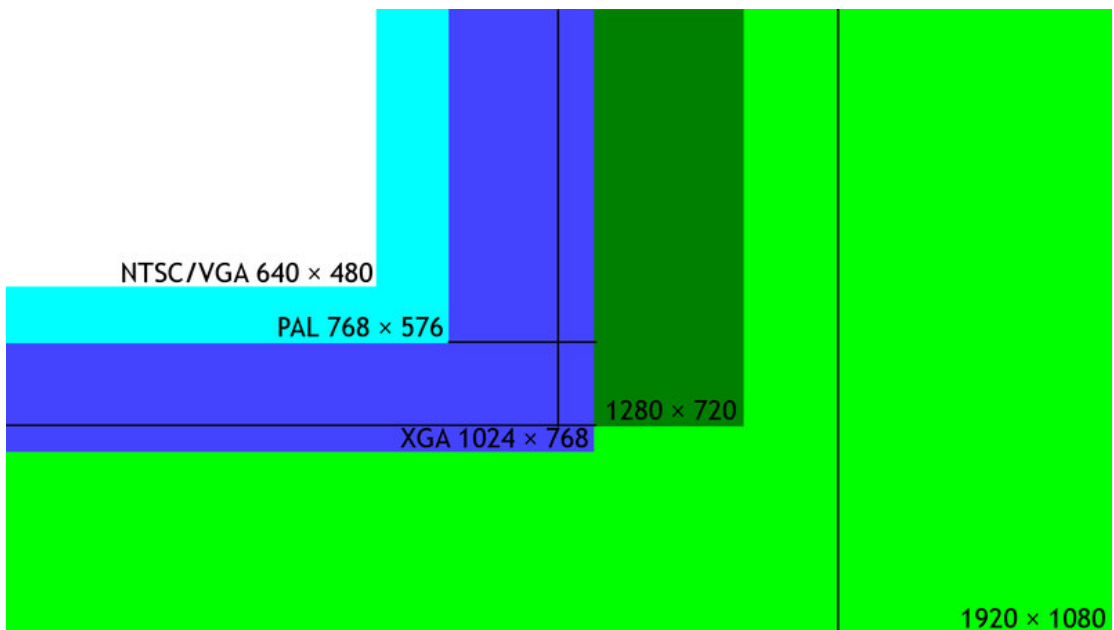
High Definition Content Protection is a digital content protection mechanism and is integrated on most DVI-D and HDMI interfaces. It also requires integration on the receive side, but because it does not allow video unless the receiving equipment (including displays) is HDCP certified, it is a much more secure way of protecting content from copying or digital distribution.

HDCP v1.3 compliant interfaces (such as HDMI and DVI-D) are required for DStv HDTV.

Appendix 7 - Some Interesting Tables

Signal Type	Resolution in pixels	Progressive-scan?	Wide-screen?	Available sources
1080/p/50 ("True" HDTV)	1,920 x 1,080	Yes	Yes	Blu-ray and future HD-DVD players; limited PS3 and X-Box 360
1080/i/25 (HDTV)	1,920 x 1,080	No	Yes	Current HD-DVD, Blu-Ray, PS3, Xbox 360
720/p/50 (HDTV)	1,280 x 720	Yes	Yes	DStv HD; Current HD-DVD; Blu-Ray, Sony PS3 (PlayStation 3); Xbox 360
480/p/50 (EDTV)	852 x 480	Yes	Yes	Progressive-scan DVD players; Nintendo Wii
576/i/25 (SDTV)	702 x 576	No	No	All

Common widescreen (16:9) TV sizes	Approximate metric size	Approximate screen height	Minimum Viewing distance for SDTV	Minimum Viewing distance for HDTV	Maximum Viewing distance for HDTV
Inches	cm	cm	meter	meter	meter
19	48	24	1.4	0.7	1.9
22	56	27	1.6	0.8	2.2
30	77	37	2.2	1.1	3.0
32	82	40	2.4	1.2	3.2
37	94	46	2.8	1.4	3.7
42	107	52	3.1	1.6	4.2
47	120	59	3.5	1.8	4.7
50	128	62	3.7	1.9	5.0
60	153	75	4.5	2.2	6.0



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